

## INTERNATIONAL SEARCH REPORT

national application No.

PCT/FI 2003/000684

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G01N 21/37, G01J 5/42

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0389071 A2 (DRESSER INDUSTRIES INC), 26 Sept 1990 (26.09.1990), page 3, line 21 - line 24; page 3, line 29 - line 33; page 5, line 41 - page 6, line 3, page 6, line 20 - line 24, figure 1	1-5
A	--	11-13
X	US 6222190 B1 (BERNSTEIN, R. ET AL), 24 April 2001 (24.04.2001), column 1, line 66 - column 2, line 10, figure 1, abstract	11-13
A	--	1-5

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

23 February 2004

Date of mailing of the international search report

27-02-2004

Name and mailing address of the ISA/

Swedish Patent Office

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PCT/FI 2003/000684

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	US 6474168 B1 (MERINGDAL, F.), 5 November 2002 (05.11.2002), column 1, line 24 - line 30; column 3, line 51 - line 65; column 5, line 13 - line 43	11-13
P,A	--	1-5
A	US 4557603 A (OEHLER, O. ET AL), 10 December 1985 (10.12.1985), column 2, line 64 - column 3, line 6; column 15, line 19 - line 29	1-5, 11-13
A	--	
A	US 6082178 A (BERNSTEIN, R. ET AL), 4 July 2000 (04.07.2000), column 1, line 36 - line 42, abstract	1-5, 11-13
A	--	
A	US 4355234 A (FERTIG, G.H. ET AL), 19 October 1982 (19.10.1982), column 2, line 37 - line 44	1-5, 11-13
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# INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/FI 2003/000684**

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

**see extra sheet**

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
**1-5, 11-13**

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

The present application relates to 4 different inventions. The separate inventions are:

**Invention 1:** Claims 1-4 and 11-13 relate to a photo acoustic detector including a first chamber with a window admitting infrared radiation/light to get through. The chamber wall has an aperture in communication with a membrane. The membrane is movable in response to the movement of the gas, which moves when it absorbs the infrared radiation/light.

**Invention 2:** Claims 5-10 relate to a photo acoustic detector including a first chamber with a window admitting infrared radiation/light to get through. The chamber wall has an aperture in communication with a membrane. The membrane is movable in response to the movement of the gas, which moves when it absorbs the infrared radiation/light. The detector includes light sources for illuminating the membrane and detectors for receiving the reflected light for optic measurement of the membrane movement.

**Invention 3:** An alternative solution in claim 5 also relates to a photo acoustic detector including a first chamber with a window admitting infrared radiation/light to get through. The chamber wall has an aperture in communication with a membrane. The membrane is movable in response to the movement of the gas, which moves when it absorbs the infrared radiation/light. The membrane is fabricated from an electrically highly conductive material or is coated with a metal. The measuring system includes a metal-coated diaphragm in the proximity of the membrane, composing a capacitor together with the membrane.

**Invention 4:** Claims 14-15 relate to a method for optimizing the amplitude of the membrane movement applying a certain optimization equation.

The special technical feature of invention 1 is to provide a contactless measurement of the membrane movement.

The special technical feature of invention 2 is to provide a contactless measurement of the membrane movement using optical angular and/or translatory measurements.

The special technical feature of invention 3 is to provide a contactless measurement of the membrane movement using the capacitance variations when the membrane is moving.

The special technical feature of invention 4 is to provide an optimized membrane in a sensor for a photo acoustic detector.

The single general concept of the present application is the contactless measurement of a membrane movement.

However, this concept is well-known from the prior art since EP 0389071 discloses a silicon diaphragm pressure transducer. The transducer includes a device having a pair of spaced apart conductive plates defining capacitor plates, and a flexible diaphragm or membrane. A first capacitance exists between the first capacitor plate and the diaphragm. In like manner, a second capacitance exists between the second capacitor plate and the diaphragm. When the diaphragm deflects due to a change in pressure, the capacitances change as well.

Since the concept is known, it cannot be inventive. Hence, there is no single general inventive concept in the sense of Rule 13.1 PCT.

No other features can be distinguished which can be considered as same or corresponding special technical features in the sense of Rule 13.2 PCT.

Thus, the application lacks unity of invention.

## INTERNATIONAL SEARCH REPORT

Information on patent family members

24/12/2003

International application No.

PCT/FI 2003/000684

EP	0389071	A2	26/09/1990	DE	69015670	D,T	18/05/1995
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				DE	69033664	D,T	10/05/2001
				EP	0631122	A,B	28/12/1994
				EP	0854358	A,B	22/07/1998
				JP	2290524	A	30/11/1990
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US	6222190	B1	24/04/2001	AT	235676	T	15/04/2003
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				DE	3279158	D	00/00/0000
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				EP	0072821	A,B	02/03/1983
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				AU	4733496	A	27/08/1996
				DE	69610225	D,T	04/01/2001
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				NO	300078	B	01/04/1997
				NO	950505	A	12/08/1996
				WO	9624831	A	15/08/1996
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US	4355234	A	19/10/1982	CA	1164248	A	27/03/1984
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